

U.S. Patent Application Serial No. 09/670,399
Response filed November 15, 2005
Reply to OA dated June 17, 2005

AMENDMENTS TO THE CLAIMS:

Please amend claims 1, 2, 4, 5, 6, 7, 10, 14, 19, 20, 21, 22 and 23, as follows. This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently amended): A method for separating two or more kinds of molecules dissolved in a sample by the dielectrophoretic force, comprising

forming ~~the~~ a reaction mixture containing a complex substance of ~~the~~ a "specific molecule" in a sample and ~~the~~ a "substance capable of changing dielectrophoretic properties of the specific molecule", which binds to the "specific molecule", and

~~applying~~ subjecting the resulting reaction mixture containing the complex substance to application of dielectrophoresis using a nonuniform electric field, which is an AC electric field or a DC electric field having an electric field strength of 500 kV/m or higher which is formed by electrodes which are made of conductive material, and

separating the complex substance from molecules other than the "specific molecule" in the sample.

Claim 2 (Currently amended): A method for determining an amount of a component in a sample, comprising

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forming a reaction mixture containing a complex substance of a "specific molecule" in a sample and a "substance capable of changing dielectrophoretic properties of the specific molecule" which binds to the "specific molecule",

applying subjecting the resulting reaction mixture containing the complex substance to application of dielectrophoresis using a nonuniform electric field, which is an AC electric field or a DC electric field having an electric field strength of 500 kV/m or higher which is formed by electrodes which are made of conductive material,

separating the complex substance from molecules other than the "specific molecule",

measuring the "specific molecule" in the separated complex substance or a molecule other than the "specific molecule" in the sample, and

determining ~~an~~ the amount of the component in the sample on the basis of the measurement result.

Claim 3 (Original): The method according to claim 2, wherein each of the component and the "specific molecule" is a "molecule to be measured".

Claim 4 (Currently amended): A method for separating a complex substance of a "specific molecule" in a sample, a "substance binding to the specific molecule" and a "substance capable of changing dielectrophoretic properties of the specific molecule" which binds to the "specific molecule" from the "substance binding to the specific molecule" which is not involved in forming

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the complex substance, comprising

contacting the sample containing the "specific molecule" with the "substance binding to the specific molecule", and the "substance capable of changing dielectrophoretic properties of the specific molecule" to form a reaction mixture containing the complex substance, and

applying subjecting the resulting reaction mixture containing the complex substance to the application of dielectrophoresis using a nonuniform electric field, which is an AC electric field or a DC electric field having an electric field strength of 500 kV/m or higher which is formed by electrodes which are made of conductive material, and

separating the complex substance from the "substance binding to the specific molecule" which is not involved in forming the complex substance.

Claim 5 (Currently amended): A method for detecting a "specific molecule" in a sample, comprising

contacting a sample containing a "specific molecule" with a "substance binding to the specific molecule", and a "substance capable of changing dielectrophoretic properties of the specific molecule" which binds to the "specific molecule" to form a reaction mixture containing a complex substance of the "specific molecule", the "substance binding to the specific molecule", and the "substance capable of changing dielectrophoretic properties of the specific molecule",

applying subjecting the resulting reaction mixture containing the complex substance to the application of dielectrophoresis using a nonuniform electric field, which is an AC electric field or

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a DC electric field having an electric field strength of 500 kV/m or higher which is formed by electrodes which are made of conductive material,

separating the complex substance from the "substance binding to the specific molecule" which is not involved in forming the complex substance,

measuring the "substance binding to the specific molecule" in the separated complex substance, and

detecting the presence or absence of the "specific molecule" in the sample on the basis of the measurement result.

Claim 6 (Currently amended): A method for determining an amount of a component in a sample, comprising

contacting a sample containing a "specific molecule" with a "substance binding to the specific molecule" and a "substance capable of changing dielectrophoretic properties of the specific molecule" which binds to the "specific molecule" to form a reaction mixture of a complex substance of the "specific molecule" and the "substance capable of changing dielectrophoretic properties of the specific molecule",

applying subjecting the resulting reaction mixture containing the complex substance to the application of dielectrophoresis using a nonuniform electric field, which is an AC electric field or a DC electric field having an electric field strength of 500 kV/m or higher which is formed by electrodes which are made of conductive material,

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separating the complex substance from the "substance binding to the specific molecule" which is not involved in forming the complex substance,

measuring the "specific molecule" or the "substance binding to the specific molecule" in the separated complex substance or the "substance binding to the specific molecule" which is not involved in forming the complex substance, and

determining ~~an~~ the amount of the component in the sample on the basis of the measurement result.

Claim 7 (Currently amended): A method for determining an amount of a component in a sample, comprising

contacting a sample containing a "specific molecule" with a "specific molecule labeled by a labeling substance", and a "substance capable of changing dielectrophoretic properties of the specific molecule" which binds to the "specific molecule" to form a reaction mixture containing a labeled complex substance of the "specific molecule labeled by the labeling substance" and the "substance capable of changing dielectrophoretic properties of the specific molecule",

~~applying~~ subjecting the resulting reaction mixture containing the labeled complex substance to the application of dielectrophoresis using a nonuniform electric field, which is an AC electric field or a DC electric field having an electric field strength of 500 kV/m or higher which is formed by electrodes which are made of conductive material,

separating the labeled complex substance from the "specific molecule labeled by the labeling

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substance" which is not involved in forming the complex substance,

measuring the "specific molecule labeled by the labeling substance" in the separated labeled complex substance or the "specific molecule labeled by the labeling substance" which is not involved in forming the complex substance, and

determining ~~an~~ the amount of the component in the sample on the basis of the measurement result.

Claim 8 (Original): The method according to any one of claims 1 to 7, wherein the sample containing the "specific molecule" is a sample derived from a living body, or a treated material of the body-derived sample.

Claim 9 (Previously Presented): The method according to claim 8, wherein the "substance capable of changing dielectrophoretic properties of the specific molecule" is a substance which can give to the "specific molecule" dielectrophoretic properties, on the basis of which the "specific molecule" can be separated from molecules other than the "specific molecule" contained in the sample by dielectrophoresis, by binding the "specific molecule".

10. (Currently amended): The method according to ~~claim 9~~ any one of claims 4, 5 and 6,
wherein the sample containing the "specific molecule" is a sample derived from a living
body, or a treated material of the body-derived sample,

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wherein the "substance capable of changing dielectrophoretic properties of the specific molecule" is a substance which can give to the "specific molecule" dielectrophoretic properties, on the basis of which the "specific molecule" can be separated from molecules other than the "specific molecule" contained in the sample by dielectrophoresis, by binding the "specific molecule", and

wherein the "substance binding to the specific molecule" is a substance which binds to the specific molecule by an "antigen"-"antibody" reaction, a "sugar chain"-"lectin" reaction, an "enzyme"-"inhibitor" reaction, a "protein"-"peptide chain" reaction, a "chromosome or nucleotide chain"-"nucleotide chain" reaction.

Claim 11 (Withdrawn): A kit for measuring a component in a sample, comprising a "substance capable of changing dielectrophoretic properties of the specific molecule" in the sample, which can form a complex substance with the "specific molecule".

Claim 12 (Withdrawn): A kit for measuring a component in a sample comprising a "substance binding to a specific molecule" in the sample and a "substance capable of changing dielectrophoretic properties of the specific molecule", wherein these substances can form a complex substance with a "specific molecule" in a sample.

Claim 13 (Withdrawn): The kit according to claim 10, further comprising a combination with a dielectrophoresis apparatus.

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Claim 14 (Currently amended): A method for separating two or more kinds of molecules[[,]] from each other, which comprises placing a solution in which the two or more kinds of molecules are dissolved under a nonuniform electric field having an electric field strength of 500 KV/m or higher, formed by electrodes which have a structure capable of forming a nonuniform electric field and which are made of conductive material.

Claim 15 (Previously presented): A method for detecting a molecule to be measured in a sample, which comprises

reacting a liquid sample, in which a "molecule to be measured" is dissolved, and a solution, in which a "substance specifically binding to the molecule to be measured" is dissolved, to obtain a solution in which a complex substance of the "molecule to be measured" and the "substance specifically binding to the molecule to be measured", and the "substance specifically binding to the molecule to be measured" which is not involved in the reaction are dissolved,

placing the solution under a nonuniform electric field having an electric field strength of 500 KV/m or higher, the field being formed by electrodes which have a structure capable of forming a horizontally and vertically ununiform electric field and which are made of conductive material,

separating the complex substance from the "substance specifically binding to the molecule to be measured" which is not involved in the reaction,

measuring the "substance specifically binding to the molecule to be measured" in the complex substance, and

detecting the presence or absence of the "molecule to be measured" in the sample on the basis of the measurement result.

Claim 16 (Previously presented): A method for measuring a substance to be measured in a sample, which comprises

reacting a liquid sample, in which a "molecule to be measured" is dissolved, and a solution, in which a "substance specifically binding to the molecule to be measured" is dissolved, to obtain a solution in which a complex substance of the "molecule to be measured" and the "substance specifically binding to the molecule to be measured", and the "substance specifically binding to the molecule to be measured" which is not involved in the reaction are dissolved,

placing the solution under a nonuniform electric field having an electric field strength of 500 KV/m or higher, the field being formed by electrodes which have a structure capable of forming a horizontally and vertically ununiform electric field and which are made of conductive material,

separating the complex substance from the "substance specifically binding to the molecule to be measured" which is not involved in the reaction, and

measuring the "substance specifically binding to the molecule to be measured" in the complex substance, or the "substance specifically binding to the molecule to be measured" which is not involved in the reaction.

Claim 17 (Previously presented): A method for measuring a substance to be measured in a sample, comprising

reacting a liquid sample containing a "molecule to be measured", a "molecule to be measured labeled by a labeling substance", and a "substance specifically binding to the molecule to be measured" to obtain a solution containing a complex substance of the "molecule to be measured labeled by a labeling substance" and the "substance specifically binding to the molecule to be measured", a complex substance of the "molecule to be measured" and the "substance specifically binding to the molecule to be measured", and the "molecule to be measured labeled by a labeling substance which is not involved in the reaction,

placing the obtained solution under a nonuniform electric field having an electric field strength of 500 KV/m or higher, the field being formed by electrodes which have a structure capable of forming a horizontally and vertically ununiform electric field and which are made of conductive material,

separating the complex substance of the "molecule to be measured labeled by a labeling substance" and the "substance specifically binding to the molecule to be measured" from the "molecule to be measured labeled by a labeling substance" which is not involved in forming the complex, and then

measuring the "molecule to be measured labeled by a labeling substance" in the complex substance or the "molecule to be measured labeled by a labeling substance which is not involved in forming the complex substance to determine the amount of the molecule to be measured in the

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sample based on the results.

Claim 18 (Original): The method according to any one of claims 14 to 16, wherein the solution in which the two or more kinds of molecules are dissolved or the sample containing a "molecule to be measured" is a sample derived from a living body, or a treated material of the body-derived sample.

Claim 19 (Currently amended): The method according to any one of claims ~~14~~ 15 to 16, wherein the "substance specifically binding to the molecule to be measured" is a substance which binds to the molecule to be measured by an "antigen"-"antibody" reaction, a "sugar chain"-"lectin" reaction, an "enzyme"-"inhibitor" reaction, a "protein"-"peptide chain" reaction, a "chromosome or nucleotide chain"-"nucleotide chain" reaction.

Claim 20 (Currently amended): The method according to any one of claims ~~14~~ 15 to 16, wherein any one of the "molecule to be measured" and the "substance specifically binding to the molecule to be measured" is a protein, and the other is a peptide chain.

Claim 21 (Currently amended): The method according to any one of claims ~~14~~ 15 to 16, wherein any one of the "molecule to be measured" and the "substance specifically binding to the molecule to be measured" is a chromosome or nucleotide chain, and the other is a nucleotide chain,

protein, or peptide chain.

Claim 22 (Currently amended): The method according to any one of claims ~~14~~ 15 to 16, wherein any one of the "molecule to be measured" and the "substance specifically binding to the molecule to be measured" is a glucide, and the other is a protein or peptide chain.

Claim 23 (Currently amended): The method according to any one of claims ~~14~~ 15 to 16, wherein any one of the "molecule to be measured" and the "substance specifically binding to the molecule to be measured" is a lectin, and the other is a sugar chain.

Claim 24 (Previously Presented): A method according to claim 1, wherein the "substance capable of changing dielectrophoretic properties of the specific molecule" is one having a size of 1mm or less, and the nonuniform electric field is one having an electric field strength of 3.5 MV/m or less which is caused by applying an applied frequency of 100 Hz to 10 Hz.

Claim 25 (Previously Presented): A method according to claim 1, wherein the separation of the complex substance from molecules other than the "specific molecule" by dielectrophoresis is conducted by (i) only dielectrophoretic forces or (ii) only the combination of (a) dielectrophoretic forces and (b) forces selected from group consisting of electrophoretic forces and forces of a solution flow (forces by a mobile phase).